

10/19/98



03 U.S. PTO

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Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

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**UTILITY
PATENT APPLICATION
TRANSMITTAL**

(Only for new nonprovisional applications under 37 C.F.R. § 1.53(b))

Attorney Docket No. MJV-117-B

First Inventor or Application Identifier Jorge Morando

Title Inert Pump Leg Adapted for Immersion in Molten Metal

Express Mail Label No.

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. ☒ * Fee Transmittal Form (e.g., PTO/SB/17)
(Submit an original and a duplicate for fee processing)
2. ☒ Specification [Total Pages]
(preferred arrangement set forth below)
- Descriptive title of the invention
- Cross References to Related Applications
- Statement Regarding Fed sponsored R & D
- Reference to Microfiche Appendix
- Background of the invention
- Brief Summary of the invention
- Brief Description of the Drawings (if filed)
- Detailed Description
- Claim(s)
- Abstract of the Disclosure
3. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets 4]
4. Oath or Declaration [Total Pages]
a. ☒ Newly executed (original or copy)
b. ☐ Copy from a prior application (37 C.F.R. § 1.63(d))
(for continuation/divisional with Box 17 completed)
(Note Box 5 below)
i. ☐ **DELETION OF INVENTOR(S)**
Signed statement attached deleting
inventor(s) named in the prior application,
see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b).
5. ☐ Incorporation By Reference (useable if Box 4b is checked)
The entire disclosure of the prior application, from which a
copy of the oath or declaration is supplied under Box 4b, is
considered to be part of the disclosure of the accompanying
application and is hereby incorporated by reference therein.

6. ☐ Microfiche Computer Program (Appendix)
7. Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)
a. ☐ Computer Readable Copy
b. ☐ Paper Copy (identical to computer copy)
c. ☐ Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

8. ☐ Assignment Papers (cover sheet & document(s))
9. ☐ 37 C.F.R. § 3.73(b) Statement ☐ Power of Attorney
(when there is an assignee)
10. ☐ English Translation Document (if applicable)
11. ☐ Information Disclosure ☐ Copies of IDS
Statement (IDS)/PTO-1449 Citations
12. ☐ Preliminary Amendment
13. ☐ Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)
14. ☐ * Small Entity ☐ Statement filed in prior application,
Statement(s) Status still proper and desired
(PTO/SB/09-12)
15. ☐ Certified Copy of Priority Document(s)
(if foreign priority is claimed)
16. ☐ Other:

* NOTE FOR ITEMS 1 & 14: IN ORDER TO BE ENTITLED TO PAY SMALL ENTITY
FEES, A SMALL ENTITY STATEMENT IS REQUIRED (37 C.F.R. § 1.27), EXCEPT
IF ONE FILED IN A PRIOR APPLICATION IS RELIED UPON (37 C.F.R. § 1.28).

17. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment:

☒ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No: 09 / 130,937

Prior application information: Examiner Group / Art Unit: 3745

18. CORRESPONDENCE ADDRESS☒ Customer Number or Bar Code Label

IDON304909

or ☒ Correspondence address below

(Insert Customer No. or Attach bar code label here)

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Name (Print/Type)	Charles W. Chandler	Registration No. (Attorney/Agent)	24,290
Signature		Date	10/16/98

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FEE TRANSMITTAL

Patent fees are subject to annual revision on October 1.
These are the fees effective October 1, 1997.
Small Entity payments must be supported by a small entity statement,
otherwise large entity fees must be paid. See Forms PTO/SB/09-12.
See 37 C.F.R. §§ 1.27 and 1.28.

TOTAL AMOUNT OF PAYMENT (\$)

Complete if Known

Application Number

Filing Date

First Named Inventor

Examiner Name

Group / Art Unit

Attorney Docket No.

METHOD OF PAYMENT (check one)

1. ☐ The Commissioner is hereby authorized to charge indicated fees and credit any over payments to:

Deposit
Account
Number
Deposit
Account
Name

☐ Charge Any Additional
Fee Required Under
37 C.F.R. §§ 1.16 and 1.17

☐ Charge the Issue Fee Set in
37 C.F.R. § 1.18 at the Mailing
of the Notice of Allowance

2. ☒ Payment Enclosed:

☒ Check ☐ Money
Order ☐ Other

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Small Entity Fee Code	Fee (\$)	Fee (\$)	Fee Description	Fee Paid
101	201	790	395	Utility filing fee	395
106	206	330	165	Design filing fee	
107	207	540	270	Plant filing fee	
108	208	790	395	Reissue filing fee	
114	214	150	75	Provisional filing fee	

SUBTOTAL (1) (\$) 395

2. EXTRA CLAIM FEES

Total Claims	Extra Claims	Fee from below	Fee Paid
13	-20** = 0	X 0 = 0	
Independent Claims	3 - 3** = 0	X 0 = 0	
Multiple Dependent			

**or number previously paid, if greater; For Reissues, see below

Large Entity Fee Code	Small Entity Fee Code	Fee (\$)	Fee (\$)	Fee Description
103	203	22	11	Claims in excess of 20
102	202	82	41	Independent claims in excess of 3
104	204	270	135	Multiple dependent claim, if not paid
109	209	82	41	** Reissue independent claims over original patent
110	210	22	11	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) (\$) 0

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Small Entity Fee Code	Fee (\$)	Fee (\$)	Fee Description	Fee Paid
105	130	205	85	Surcharge - late filing fee or oath	
127	50	227	25	Surcharge - late provisional filing fee or cover sheet	
139	130	139	130	Non-English specification	
147	2,520	147	2,520	For filing a request for reexamination	
112	920*	112	920*	Requesting publication of SIR prior to Examiner action	
113	1,840*	113	1,840*	Requesting publication of SIR after Examiner action	
115	110	215	55	Extension for reply within first month	
116	400	216	200	Extension for reply within second month	
117	950	217	475	Extension for reply within third month	
118	1,510	218	755	Extension for reply within fourth month	
128	2,080	228	1,030	Extension for reply within fifth month	
119	310	219	155	Notice of Appeal	
120	310	220	155	Filing a brief in support of an appeal	
121	270	221	135	Request for oral hearing	
138	1,510	138	1,510	Petition to institute a public use proceeding	
140	110	240	55	Petition to revive - unavoidable	
141	1,320	241	680	Petition to revive - unintentional	
142	1,320	242	680	Utility issue fee (or reissue)	
143	450	243	225	Design issue fee	
144	670	244	335	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	50	123	50	Petitions related to provisional applications	
126	240	126	240	Submission of Information Disclosure Stmt	
581	40	581	40	Recording each patent assignment per property (times number of properties)	
146	790	246	395	Filing a submission after final rejection (37 CFR 1.129(a))	
149	790	249	395	For each additional invention to be examined (37 CFR 1.129(b))	

Other fee (specify) _____

Other fee (specify) _____

* Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$) 0

SUBMITTED BY

Typed or
Printed Name

Charles W. Chandler

Signature

Date

10/14/98

Complete (if applicable)

Reg. Number

24,290

Deposit Account
User ID

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INERT PUMP LEG ADAPTED FOR IMMERSION IN MOLTEN METAL

Cross-Reference to Related Application

5 This application is a continuation-in-part of application Serial No. 09/130,937, filed August 7, 1998 for "Advanced Motor Driven Impeller Pump for Moving Metal in a Bath of Molten Metal".

Background of the Invention

10 This invention is related to a structure for supporting a pump or similar apparatus immersed below the metal level of a bath of molten metal, such as aluminum or zinc.

15 In my aforementioned co-pending patent application, I disclosed a vertical post or leg for supporting a pump immersed in a bath of molten metal beneath an overhead structure above the bath of molten metal. Certain pumps disclosed in my prior patent application are buoyant in a bath of molten metal because of their lower specific density. In order to locate the pump in a suitable position below the metal level, it is desirable to have one or more overhead support legs. I disclosed a support leg having a ceramic sleeve extending between the overhead structure and the pump. The ceramic sleeve material is resistant to the heat of the molten metal. An internal vertical
20 graphite leg is disposed in the sleeve. The graphite leg has sufficient compressive strength to support the pump in the bath of molten metal but has a tendency to burn in the presence of heat and oxygen. I disclosed a means for protecting the graphite leg by providing an internal chamber around the graphite leg and in the ceramic sleeve. An inert gas, such as nitrogen, protects the graphite from burning. However, I have found
25 in some cases it is unnecessary to have a gas filled chamber in the sleeve to protect

the graphite. Further, I have found novel means for introducing an inert gas into the ceramic sleeve to prevent burning of the graphite.

Summary of the Invention

The broad purpose of the present invention is to provide an improved vertical leg structure for supporting a pump immersed in a bath of molten metal beneath an overhead structure disposed above the molten metal. In the preferred embodiment of the invention a ceramic sleeve extends between the overhead structure and the pump housing. It has a sufficient height to hold the housing in the bath of molten metal. An internal leg of a graphite material is disposed in the sleeve to provide a vertical support between the overhead structure and the pump housing.

A slight clearance between the ceramic sleeve and the graphite leg forms a chamber which is filled in various ways by both, gaseous and non-gaseous but inert materials. The leg comprises a vertical ceramic sleeve housing and a vertical graphite leg that extends between the overhead supporting structure and the pump housing. The sleeve covers that portion of the graphite exposed to the heat of the molten metal and above the metal line where severe burning of the graphite would occur due to the oxygen present in air.

Still further objects and advantages of the invention will become readily apparent to those skilled in the art to which the invention pertains upon reference to the following detailed description.

Description of the Drawings

The description refers to the accompanying drawings in which like reference characters refer to like parts throughout the several views and in which:

FIGURE 1 shows a ceramic sleeve shielding a leg disposed in an atmosphere containing an inert gas;

FIGURE 2 is a view of an alternative means for connecting the lower end of the leg to the pump housing;

5 FIGURE 3 is a view of another support leg in which the graphite is shielded by a inert gas;

FIGURE 4 is a view as seen along lines 4-4 of Figure 3;

FIGURE 5 is a view in which the sleeve provides an inert chamber containing inert non-gaseous materials for protecting the graphite leg;

10 FIGURE 6 is a view as seen along lines 6-6;

FIGURE 7 is an enlarged fragmentary view of the inert chamber; and

FIGURE 8 is still a further enlarged view showing the manner in which a nylon tape is wrapped around the leg to form a double chamber containing a porous cement.

Description of the Preferred Embodiment

15 Figure 1 shows a shielded leg 10 supporting a pump housing 12 beneath the metal level 14 of a bath of molten metal, such as aluminum or zinc. The upper end of the leg is connected to a cover plate 16.

The cover plate has an opening 18. An annular plate 20 is mounted on the underside of the cover plate and has a central opening 22 aligned with opening 18. A
20 fitting 24 has a gas-receiving passage 26 for receiving an inert gas, such as nitrogen, from a source of nitrogen 28 through conduit means 30.

The pump housing has a frusto-conical opening 32 which extends between its upper and lower surfaces. A sleeve formed of a ceramic material that is resistant to the heat of the molten metal is mounted between mounting plate 20 and the top surface of

the pump housing around opening 32. Sleeve 34 has a cylindrical configuration and has its upper and lower ends seated against mounting plate 20 and the pump housing, respectively.

A graphite leg 36, having a sufficient diameter to provide a structured support between cover plate 16 and pump housing 12, has its upper end abutting the mounting plate and its lower end formed with a reduced frusto-conical exterior surface that is seated in opening 32. The lower end 40 of the graphite leg is threaded for receiving a fastening nut 42.

Mounting plate 20 is attached by fastener means 43 to the cover plate.

A cement, modified by adding boron nitrite or boronit paint (obtainable from Alphatech, Inc., Cadiz, KY) is coated between the outer surface of the graphite leg, in the areas of the thicker line 44, and the ceramic sleeve, as well as between the lower end of the leg seated in opening 32, and the upper end of the leg in contact with the cylindrical skirt 45 of the mounting plate to provide a seal between the ceramic sleeve and the graphite leg that prevents the penetration of the molten metal.

A Kawool gasket 48 is mounted between the upper end of the leg and the mounting plate.

The graphite leg material has sufficient porosity to impregnate with the inert gas and create a chamber of inert nitrogen gas that prevents a combustible gas from permeating inside the ceramic sleeve to burn the graphite leg.

Referring to Figure 2, an alternative means for connecting leg 36 to pump housing 12 is illustrated in which the lower end of the leg has been enlarged to provide a frusto-conical outer surface at 50 that mates with a frusto-conical interior opening 52

in housing 12 to provide a simple disassemble and removal of a damaged leg
eventuality.

The diameter of the leg is slightly smaller than the inner surface of the sleeve
and of opening 52. A suitable inert cement 56 occupies the space between the ceramic
5 shield and the leg.

Referring back to Figure 1, the graphite leg has an axial passage 58 connecting
passage 24 so that the inert gas (nitrogen) can pass along the major length of the leg.
The graphite is sufficiently porous to house the inert gas and prevent the entry of either
air or molten metal inside the sleeve - leg chamber.

10 Figure 3 illustrates another embodiment of the invention. In this case, cover
plate 16 provides an overhead supporting structure above metal level 14. Pump
housing 12 is immersed in the bath of molten metal. Mounting plate 20 is disposed on
the under side of the cover plate and connected by fitting 60 to a source of nitrogen
under pressure 28 through conduit 30. Ceramic sleeve 62 has its upper end in
15 abutment with a Kawool gasket 64 on the underside of the mounting plate to create a
sealed chamber between the ceramic sleeve and graphite leg.

The sleeve extends through a cylindrical opening 66 in the pump housing and is
cemented by a suitable inert cement to the pump housing in the area indicated by
heavy line 80. Graphite leg 70 is housed inside the sleeve and has at its lower end an
20 enlargement to engage and support the pump housing. The outer diameter generally
corresponds to the inner diameter of the sleeve but allowing for any desirable (not
necessary) refractory cement 80 to join the leg to the sleeve and for thermal expansion.
The upper end of the sleeve also abuts gasket 64. The lower end of the sleeve
extends to the inner surface of the pump housing.

The graphite leg is formed with an external helical groove 68 which extends from its upper end to its lower end. Referring to Figure 4, the groove has an upper end 72 in communication with a radial channel 74 in the leg. The inner end of channel 74 terminates with a vertical passage 76 which is connected to conduit 30. Thus the nitrogen gas forms a helical shield around the vertical leg extending from its upper end to its lower end. A ceramic ring 78 is cemented to the sleeve to aid in preventing pump housing 12 from any vertical movement.

Figures 5-8 show still another embodiment of the invention in which a ceramic sleeve 100 has its lower end in abutment and sealed with the pump housing. The upper end of the sleeve extends above metal level 14 to a position adjacent mounting plate 20.

A graphite leg 102 has its upper end in abutment with mounting plate 20 and its lower end seated in an opening 104 in the pump housing. The lower end of the leg has an annular groove 106. The housing opening 104 has an annular groove 108. The lower end of the leg is slightly smaller than the housing opening. Grooves 106 and 108 and the space between the lower end of the leg and the housing opening is filled with a cement in the area of the heavier line 110 to prevent any molten metal from entering the lower end of the ceramic sleeve, and to join the leg to the housing.

The leg has an outer diameter smaller than the inside diameter of the sleeve to provide a tubular chamber 112. Preferably the chamber has a thickness, as illustrated in Figure 7, filled with respectively, a mix of boron nitride paint and a suitable refractory cement coating 114, a nylon tape 116 and outer layer 118, also a mix of cement and boron nitride paint. The nylon tape is cemented by a combination of the refractory cement and boron nitride paint which constitutes inner and outer layers 114

and 118. The nylon tape is wrapped in a helical wrapping as illustrated in Figure 5 from the bottom of the cylindrical skirt 120 of the mounting plate 20 to the pump housing. When the cement mix has dried, an additional layer is applied over and around the helical tape to form layer 118. Prior to the cement mix drying, this arrangement is then disposed inside the sleeve to form a gas-free environment between the leg and the sleeve now filled with inert materials that shield the graphite sleeve from burning gases.

Figure 8 is an enlarged view of the manner in which the tape is wrapped. It is preferably wrapped in an overlapping arrangement as illustrated at 122. Thus the nylon tape provides double cylindrical chambers of a ceramic low porosity cement which is both inert and non-wetting in aluminum. The boron nitride reduces the porosity of the cement and simultaneously increases the surface tension thereby eliminating the ability of molten aluminum or molten zinc to penetrate between the ceramic sleeve and the graphite leg.

Having described my invention, I claim:

Claims

1 1. An elongated support suited for positioning a pump or other similar device
2 disposed below the metal level of a bath of molten metal to support structure disposed
3 above the metal level, comprising:

4 an upright housing of a material that is resistant to the heat and
5 attack of the molten metal, said housing having an internal chamber;

6 leg structure disposed in the internal chamber, said leg structure
7 having a tendency to be combustible in the presence of oxygen and non-combustible in
8 the presence of an inert material at such times as the housing is disposed in the bath of
9 molten metal; and

10 an inert non-gaseous material disposed between said housing and
11 said leg structure to prevent burning of said leg structure.

1 2. A support as defined in claim 1 in which the housing is formed of a
2 ceramic material.

1 3. A support as defined in claim 1 in which the leg structure is formed of a
2 graphite material.

1 4. A support structure as defined in claim 1, including a refractory cement
2 disposed between the leg structure and the housing.

1 5. A support structure as defined in claim 1, in which the housing comprises
2 a vertical sleeve.

1 6. A support structure as defined in claim 1, in which the leg structure is
2 smaller than the housing so as to form a chamber therebetween, said chamber being
3 filled with cement.

1 7. A support structure as defined in claim 6, in which the cement contains
2 boron nitride.

1 8. A support structure as defined in claim 7, in which a nylon tape is
2 disposed between the leg structure and the housing to form a double chamber between
3 the leg structure and the housing, and including a cement in said double chamber.

1 9. A support structure as defined in claim 1, in which the leg structure
2 comprises a vertical leg formed of a graphite material, the graphite leg having an upper
3 end fastened to a support plate and a lower end fastened to a pump housing.

1 10. A support structure suited for positioning a pump or other similar device
2 below the metal level of a bath of molten metal with respect to support structure above
3 the metal level, comprising:

4 an upright housing of a material that is resistant to the heat and
5 attack of the molten metal, said housing having an internal chamber;

6 leg structure disposed in the internal chamber, said leg structure
7 having a tendency to be combustible in the presence of oxygen and non-combustible in
8 the presence of an inert material at such times as the housing has a lower end
9 disposed in the bath of molten metal; the leg structure comprising a vertical leg having
10 a tapered lower end;

11 a pump housing having a complementary end receiving the lower
12 end of the leg; and

13 means for fastening the leg to the pump housing.

1 11. A support structure as defined in claim 10, in which said fastening means
2 comprises a cement.

1 12. A support structure as defined in claim 11, in which the fastening means
2 comprises threaded means.

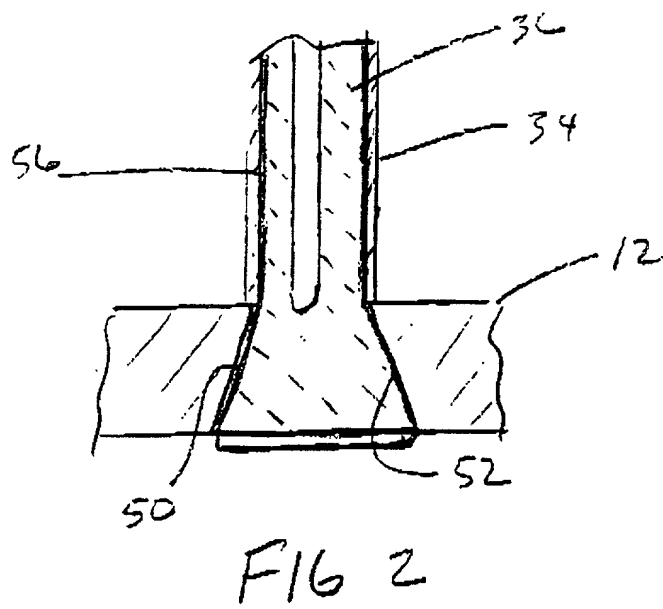
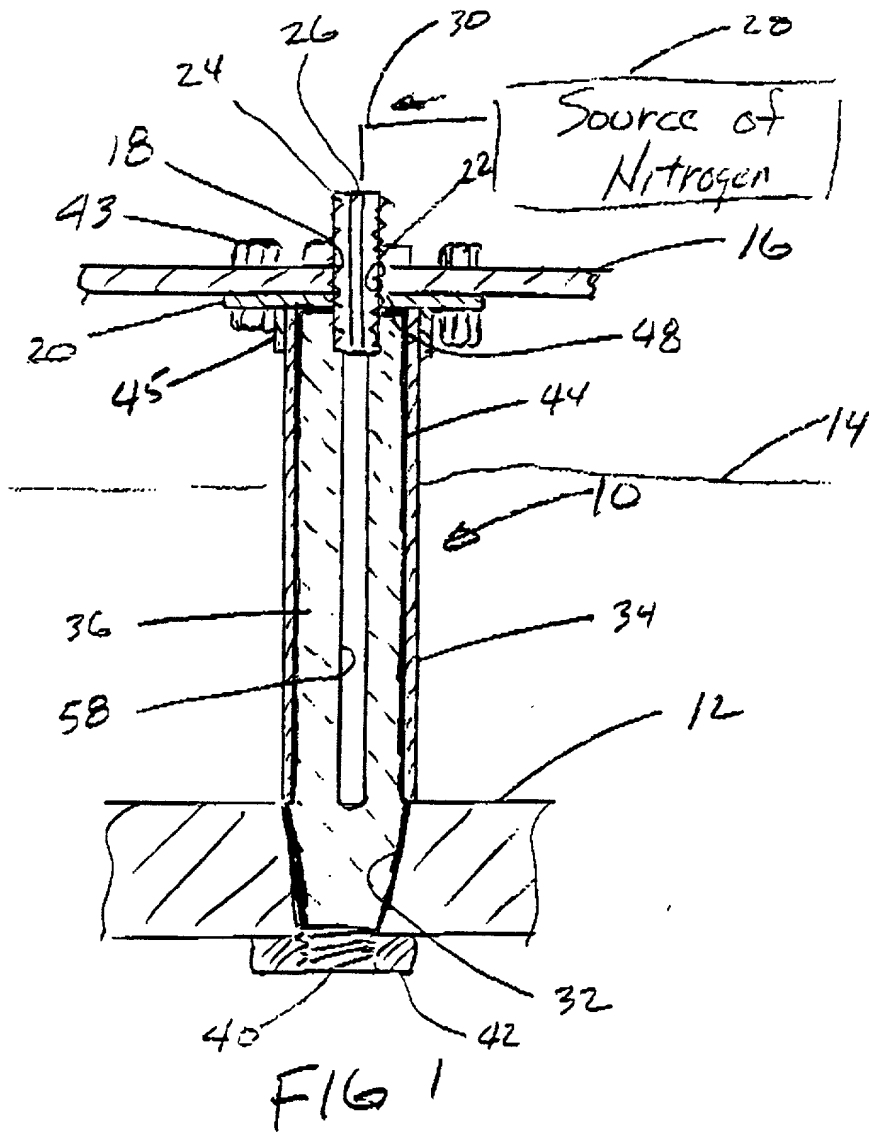
1 13. A support structure having a lower end suited for positioning an object
2 such as a pump housing below the surface of a bath of molten metal, and an upper end
3 suited for connection to structure above the bath of molten metal, comprising:

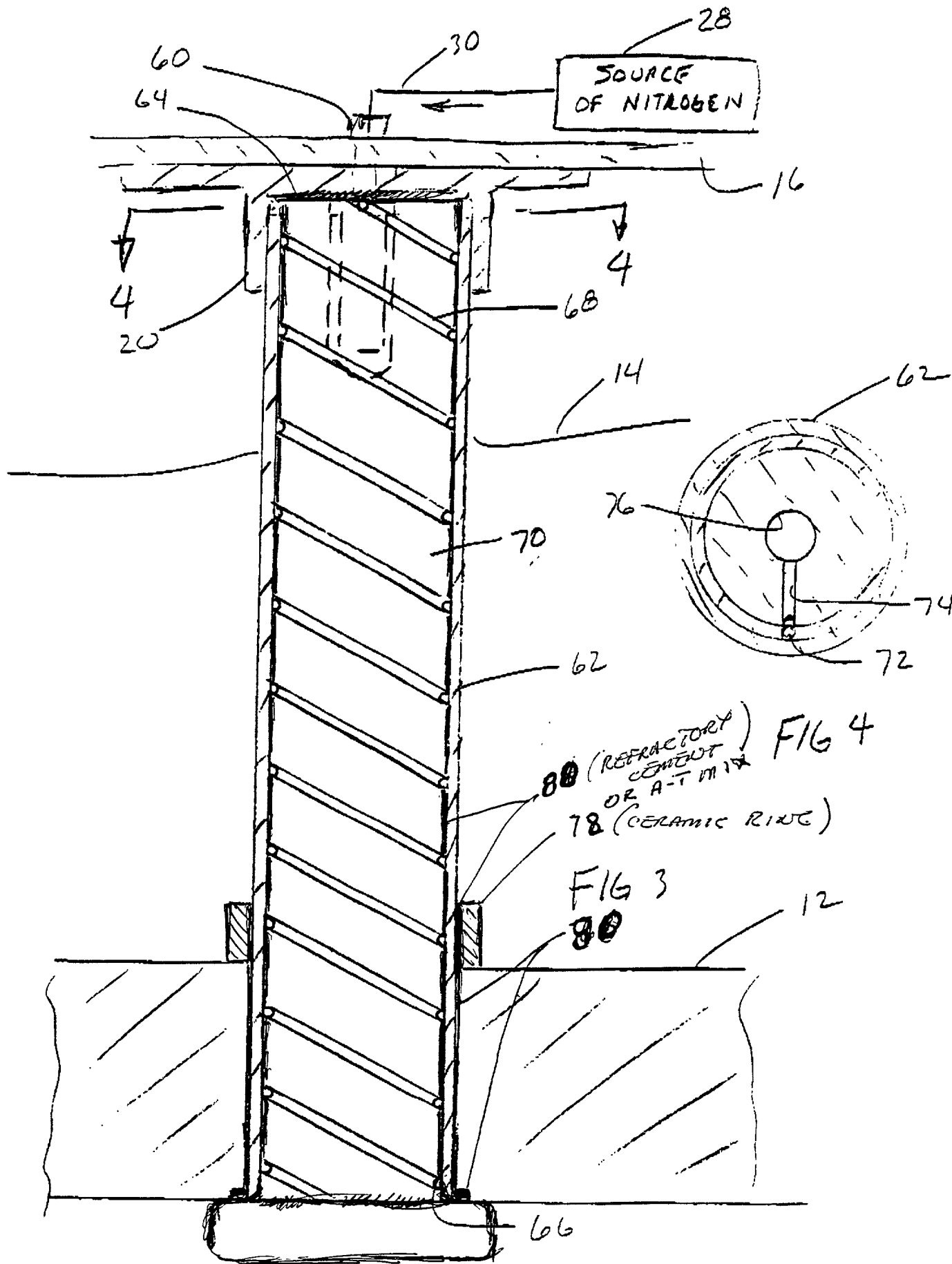
4 an elongated support leg of a graphite material, a sleeve housing
5 said support leg, said sleeve being formed of a ceramic that is resistant to the heat of
6 the molten metal, both the leg and the sleeve having a length suited for connection to a
7 support structure above the bath of molten metal and a lower end suited for connection
8 to a structure immersed below the metal level of the bath of molten metal;

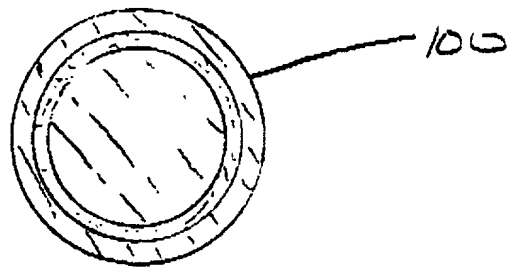
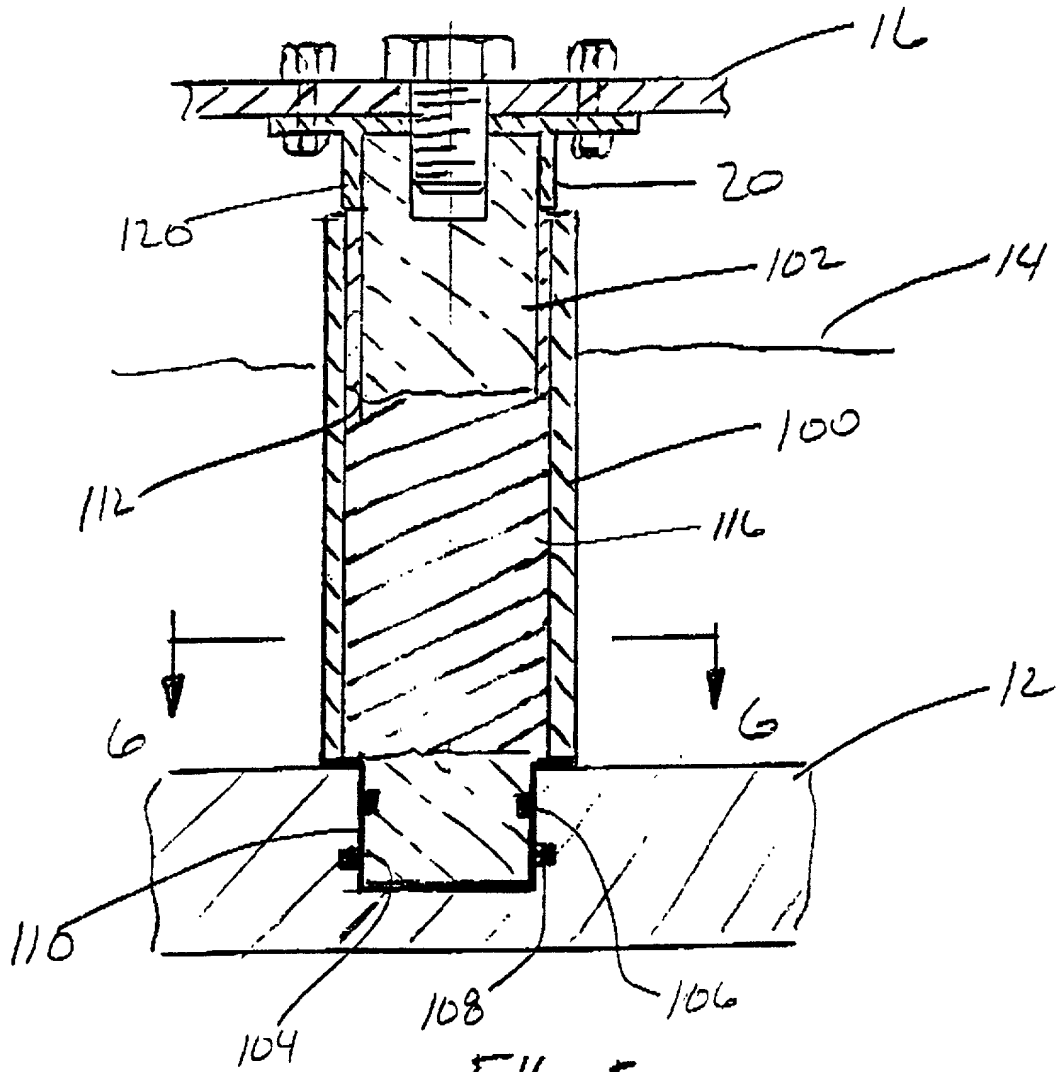
9 means forming a helical groove between the interface of the
10 graphite leg and the ceramic sleeve extending from the upper end of the leg to a
11 location proximate said immersed structure; and

12 a source of an inert gas, and means for connecting said source of
13 inert gas to said helical groove to fill the groove.

1 14. A support structure as described in claim 13, where the groove is axially
2 located on the interface of the leg and the ceramic sleeve to generate an inert gas
3 protective chamber.







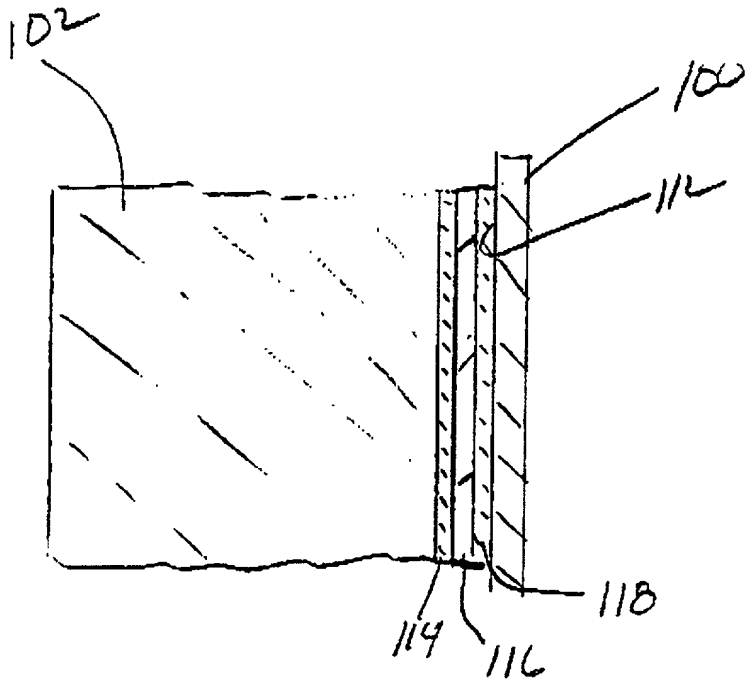


FIG 7

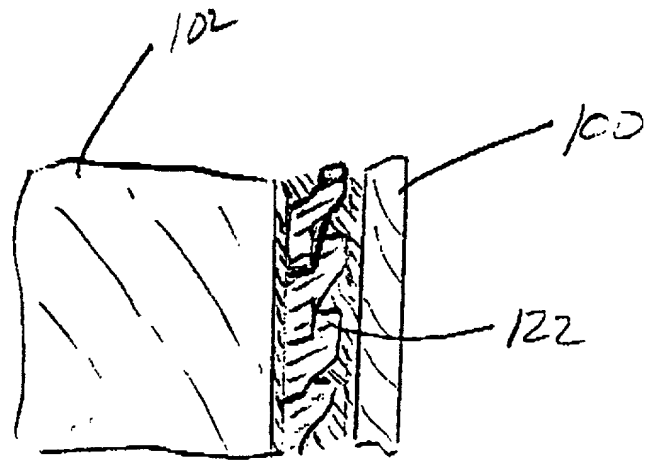


FIG 8

Type a plus sign (+) inside this box → ☐Approved for use through 9/30/98
Patent and Trademark Office U.S. DEPARTMENT OF COMMERCE

0010/PTO Rev. 6/95	U.S. Department of Commerce Patent and Trademark Office	DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION	
		<input checked="" type="checkbox"/> Declaration Submitted with Initial Filing	<input type="checkbox"/> Declaration Submitted after Initial Filing
		Attorney Docket Number MJV-117-B-C.I.P.	
		First Named Inventor Jorge A. Morando	
		COMPLETE IF KNOWN	
		Application Number	
Filing Date			
Group Art Unit			
Examiner Name			

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

INERT PUMP LEG ADAPTED FOR IMMERSION IN MOLTEN METAL

(Title of the invention)

the specification of which

☒ is attached hereto
OR☐ was filed on (MM/DD/YYYY)

as United States Application Number or PCT International

Application Number

and was amended on (MM/DD/YYYY)

(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37 Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code §119 (a)-(d) or §365(b) of any foreign application(s) for patent or inventor's certificate, or §365 (a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
				YES	NO
			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

☐ Additional foreign application numbers are listed on a supplemental priority sheet attached hereto:

I hereby claim the benefit under Title 35, United States Code §119(e) of any United States provisional application(s) listed below.

Application Number(s)	Filing Date (MM/DD/YYYY)	<input type="checkbox"/> Additional provisional application numbers are listed on a supplemental priority sheet attached hereto.

Burden Hour Statement: This form is estimated to take .4 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

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DECLARATION

Page 2

I hereby claim the benefit under Title 35, United States Code §120 of any United States application(s), or §365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of Title 35, United States Code §112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. Parent Application Number	PCT Parent Number	Parent Filing Date (MM/DD/YYYY)	Parent Patent Number (if applicable)
09/130,937		08/07/1998	

☐ Additional U.S. or PCT international application numbers are listed on a supplemental priority sheet attached hereto.

As a named inventor, I hereby appoint the following registered practitioner(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

☐ Firm Name Customer or label Number
OR
☒ List registered practitioner(s) name and registration number below:

Name	Registration Number	Name	Registration Number
Charles W. Chandler	24,290		

☐ Additional registered practitioner(s) named on a supplemental sheet attached hereto.

Please direct all correspondence to: ☐ Customer Number or label OR ☒ Correspondence address below

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Address			
City	Livonia	State	MI
ZIP	48150		
Country	U.S.A.	Telephone	(734) 522-0920
Fax	(734) 522-5657		

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Name of Sole or First Inventor: ☐ A petition has been filed for this unsigned inventor

Given Name	Jorge	Middle Initial	A.	Family Name	Morando	Suffix e.g. Jr.	
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Inventor's Signature		Date	Sept 28 1998
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Residence: City	Cadiz	State	KY	Country	U.S.A.	Citizenship	U.S.A.
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Post Office Address	526 Riverview Trail		
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Post Office Address			
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City	Cadiz	State	KY	Zip	42211	Country	U.S.A.	Applicant Authority	
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☐ Additional inventors are being named on supplemental sheet(s) attached hereto

856 T.O.T. 123456

VERIFIED STATEMENT CLAIMING SMALL ENTITY STATUS **(37 CFR 1.9(f) & 1.27(c))--SMALL BUSINESS CONCERN**

Docket Number (Optional)

MTV-117-B-C.I.P.

Applicant or Patentee: Jorge A. Morando

Application or Patent No.: _____

Filed or Issued: _____

Title: INERT PUMP LEG ADAPTED FOR IMMERSION IN MOLTEN METAL

I hereby declare that I am:

☐ the owner of the small business concern identified below:☒ an official of the small business concern empowered to act on behalf of the concern identified below:NAME OF SMALL BUSINESS CONCERN Alphatech, Inc.ADDRESS OF SMALL BUSINESS CONCERN 526 Riverview TrailCadiz, KY 42211

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.12, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees to the United States Patent and Trademark Office, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention described in:

☒ the specification filed herewith with title as listed above.☐ the application identified above.☐ the patent identified above.

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights in the invention must file separate verified statements averring to their status as small entities, and no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person made the invention, or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d), or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization having any rights in the invention is listed below:

☐ no such person, concern, or organization exists.☒ each such person, concern or organization is listed below.Jorge A. Morando526 Riverview TrailCadiz, KY 42211

Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING Jorge A. MorandoTITLE OF PERSON IF OTHER THAN OWNER PresidentADDRESS OF PERSON SIGNING 526 Riverview TrailSIGNATURE Jorge A. Morando

DATE

Sept 28 1998

2024-10-14 12:34 FAX 7345225857

**VERIFIED STATEMENT CLAIMING SMALL ENTITY STATUS
(37 CFR 1.9(f) & 1.27(b))--INDEPENDENT INVENTOR**

 Docket Number (Optional)
 MJV-117-B-C.I.P.

 Applicant or Patentee: Jorge A. Morando

Application or Patent No.: _____

Filed or Issued: _____

 Title: INERT PUMP LOG ADAPTED FOR IMMERSION IN MOLTEN METAL

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees to the Patent and Trademark Office described in:

- ☒ the specification filed herewith with title as listed above.
☐ the application identified above.
☐ the patent identified above.

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license any rights in the invention to any person who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

- ☐ No such person, concern, or organization exists.
☒ Each such person, concern or organization is listed below.

Alphatech, Inc.
 526 Riverview Trail
 Cadiz, KY 42211

Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Jorge A. Morando

NAME OF INVENTOR

NAME OF INVENTOR

NAME OF INVENTOR

Signature of inventor

Signature of inventor

Signature of inventor

Date

Date

Date

886707-12342760